Amendments to the Claims:

This listing of claims will replace all prior versions, and listing, of claims in the application. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

1. (Previously Amended) A method for identifying a chemical substance, the method comprising:

exposing said chemical substance to neutrons from an isotopic neutron source;

measuring, with a high purity germanium detector, gamma rays emitted by said chemical substance as a result of exposure to said neutrons;

creating a single spectrum of between 4096 and 16384 channels and a detection count per spectrum channel, said detection count corresponding to the number of detected gamma rays;

calibrating from said single spectrum, an energy scale based on energies within said single spectrum of neutron-induced gamma rays generated from said detector, shielding materials or container materials;

performing a peak-by-peak analysis of the corresponding gamma-ray energies of chemical elements of interest on said spectrum; and

identifying said chemical substance based on said peak-by-peak analysis of said single spectrum.

2 through 17 Previously Cancelled

18. (Previously Amended) The method of claim 1 further comprising displaying chemical

elements comprising said identified chemical substance.

19. (Original) The method of claim 1 further comprising displaying the identified chemical substance.

20. (Previously Amended) The method of claim 18 further comprising displaying a confidence level associated with the identified chemical elements.

21. (Original) The method of claim 1 further comprising displaying a confidence level associated with the identified chemical substance.

22. (Previously Amended) The method of claim 1 wherein the step of identifying the chemical substance comprises determining a presence, if any, of a first chemical element selected from the group of phosphorous and chlorine, and a ratio of second elements selected from the group consisting of arsenic, boron, hydrogen, nitrogen, oxygen, phosphorous, sulfur, silicon, titanium and zinc.

23. (Currently Amended) The method of claim 1 further comprising a step of calibrating an electronic gain of said high purity detector to adjust a known gamma-ray peak to a pre-selected channel of said ~~high-resolution~~ high purity detector.

24. (Original) The method of claim 23 wherein said known gamma-ray peak is associated with hydrogen.

25. (Original) The method of claim 24 wherein said known gamma-ray peak associated with hydrogen is generated from neutron interactions within a hydrogenous moderator block.

26. (Original) The method of claim 25 wherein the moderator block comprises polyethylene.

27. Previously Canceled

28. (Previously Amended) A method for identifying a chemical substance, the method comprising:

inducing neutrons from an isotopic neutron source into a chemical substance, said neutrons interacting within the chemical substance to generate characteristic gamma-rays;

measuring, with a high purity germanium detector, energies of said gamma-rays to create a single gamma-ray energy spectrum;

calibrating from said single spectrum, an energy scale based upon energies within said single spectrum of neutron-induced gamma rays generated from said detector, shielding materials or container materials;

performing a directed peak fit analysis comprising determining peak centroids and net peak areas extracted from said calibrated, single spectrum to determine gamma-ray counting rates for chemical elements of interest;

identifying chemical elements and their ratios contained in said chemical substance;

identifying said chemical substance by determining a presence, if any, of a first element and at least one second element.

29. (Original) The method of claim 28 wherein said first element concentration is selected from the group consisting of phosphorous and chlorine.

30. (Original) The method of claim 28 wherein said at least one second element concentration is selected from the group consisting of arsenic, boron, hydrogen, nitrogen, oxygen, phosphorous, sulfur, silicon, titanium and zinc.

31. (Currently Amended) The method of claim 28 further comprising the step of calibrating an electronic gain of said high purity detector to adjust a known gamma-ray peak to a pre-selected channel of said ~~high-resolution~~ high purity detector.

32. (Original) The method of claim 31 wherein said known gamma-ray peak is associated with hydrogen.

33. (Original) The method of claim 32 wherein said known gamma-ray peak associated with hydrogen is generated from neutron interactions within a hydrogenous moderator block.

34. (Original) The method of claim 33 wherein the moderator block comprises polyethylene.

35. (Currently Amended) The method of claim 28 wherein ~~said~~ data file information of at least one known chemical element and gamma-ray peaks associated therewith is selected from the group

consisting of iron and chlorine.

36. (Currently Amended) The method of claim 28 wherein ~~said~~ data information of known chemical elements and gamma-ray peaks associated therewith is comprised of elements contained within said detector, shielding materials or container materials.

37. (Currently Amended) The method of claim 36 wherein said data information of known chemical elements is selected from the group consisting of germanium, bismuth, aluminum, and iron.

38. (Original) The method of claim 28 further comprising displaying the identified chemical elements.

39. (Original) The method of claim 28 further comprising displaying the identified chemical substance.

40. (Original) The method of claim 28 further comprising displaying a confidence level associated with the identified chemical elements.

41. (Original) The method of claim 28 further comprising displaying a confidence level associated with the identified chemical substance.0